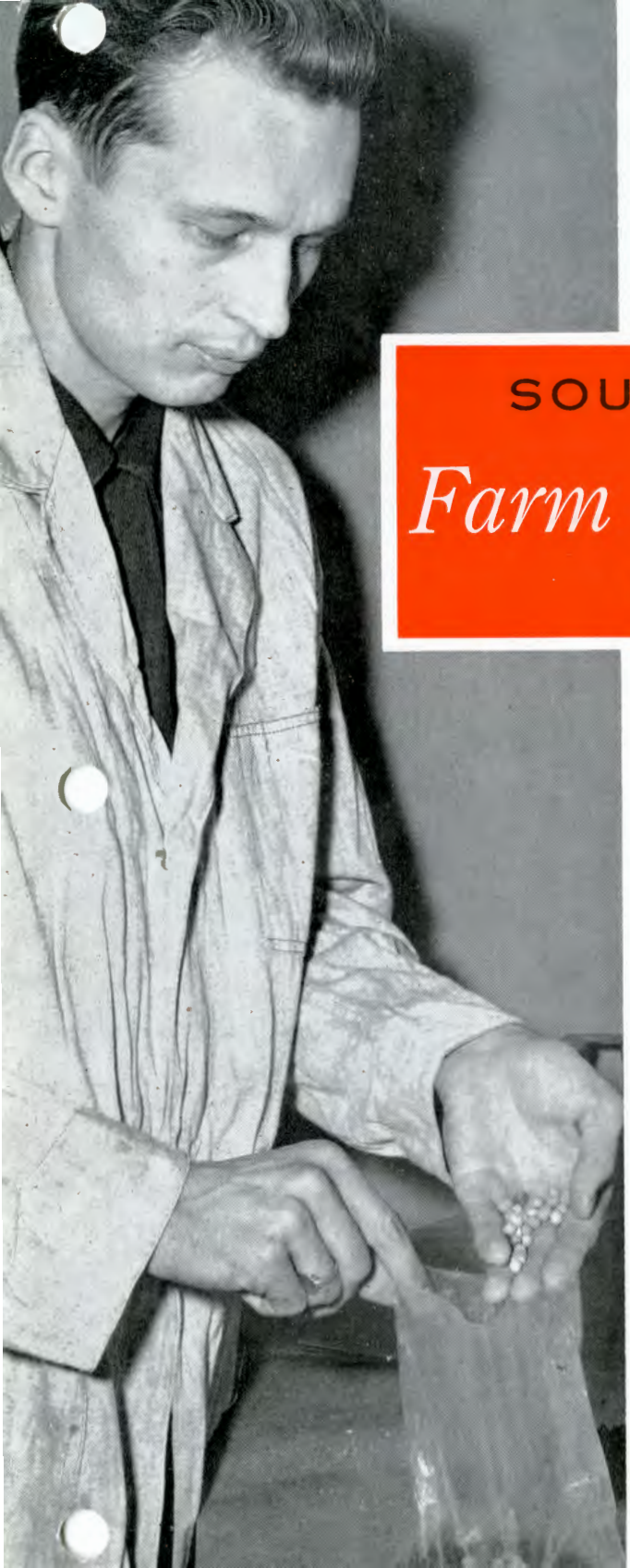
2-1959

South Dakota Farm and Home Research

Agricultural Experiment Station

FEBRUARY 1959
Volume X, Number 2



SOUTH DAKOTA *Farm and Home* RESEARCH

Stratifying Seed—see page 3

SOUTH DAKOTA
Farm and Home RESEARCH
a report of progress

Volume X FEBRUARY 1959 Number 2

IN THIS ISSUE

ON THE COVER

Before most fruit seed will germinate, it must be stratified. This is done by exposing the seed to a cold treatment. Harry E. Lasn is preparing a sample of seed for testing, to find the temperature and length of time which will give best germination. An article describing the project begins on the next page.

From Director Bentley . . .

Farmers and livestockmen look to increased efficiencies in production and marketing to help them maintain a competitive position in the marketplace and to overcome the cost-price squeeze.

Have you ever considered what sort of competitive position South Dakotans would be in today if they hadn't bothered to keep up with advances in agriculture? We would likely still be planting open pollinated corn. Our small grains would lack the disease resistance and ability to yield that our varieties have today. Our livestock and poultry rations wouldn't contain hormones or antibiotics. And what methods would we be using to control insects, diseases, and weeds?

About 70% of all crop acreage in the country now is planted to varieties that didn't even exist commercially 20 years ago. In some cases varietal shifts have taken place two or three times.

Livestock production has increased 25% per breeding unit in the last 20 years. Dairy cows produce two-thirds of a ton more milk now than in 1940. And for every two eggs a hen laid in 1940, her descendant is laying three.

This spells out efficiency. Efficiency the farmer needs to make a profit. Efficiency made possible through research.

Published quarterly by the
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE
College Station, Brookings, S. Dak.

ORVILLE G. BENTLEY,
Dean of Agriculture and Director of Experiment Station

EVERETT METCALF, *Station Editor*

GERALD GROTTA, *Assistant Editor*

JOHN ALLIE, *Artist*

SOUTH DAKOTA FARM AND HOME RESEARCH will be sent free to any resident of South Dakota in response to a written request to the Experiment Station Editor, South Dakota State College, College Station, Brookings, S. Dak.

stratifying seed

By **Harry E. Lasn**, graduate assistant, and **S. A. McCrory**, horticulturist

MOST FRUIT SEEDS, as well as seed of many other plants, require a period of cold treatment to break an internal dormancy before they will germinate. Breaking this rest period is called stratification. It is brought about by exposing the seed to low temperatures (usually between 32° and 50° F.) with abundant moisture and adequate oxygen for from 1 to 4 months. This imitates conditions the seed would encounter if left outdoors.

Most people associated with growing plants from seed, whether nurserymen or backyard gardeners,

Sand and peat moss are prepared (top) and placed in a plastic bag along with the seed being tested (center). The bag is stored in a refrigerator (bottom) for various lengths of time and at different temperatures, then tested for germination.

know about the stratification requirements of seed. However, they lack specific information concerning the most favorable temperature and length of stratification.

This research problem was undertaken to try to find most favorable conditions for stratification of four fruit plants hardy in South Dakota—Siberian crabapple (*Malus baccata),* sandcherry *(Prunus besseyi),* wild plum *(Prunus americana*), and black walnut (*Juglans nigra*).

Seed of each species was divided into 12 equal lots. The 12 lots of seed of each species were placed in separate polyethylene bags containing a moist medium of one-third part sand and two-thirds part ground peat moss. The bags were then exposed to various temperatures for varying lengths of time.

Results of the experiment are shown in the table, which gives the most favorable temperature and length of time for stratification. Higher germination did occur in the Siberian crabapple and sandcherry at higher temperatures and longer durations of stratification. However, most of the germination occurred while the seeds were in stratification. This is not desirable since the sprouted seed is apt to get damaged during planting.

Most Favorable Stratification Requirements (Temperature and Duration) of Species Studied

Species	Temperature in °F.	Duration in Days
Siberian Crabapple	37° F.	30
Sandcherry	33° F.	120*
Wild Plum	42° F.	120*
Black Walnut	42° F.	120*

*Minimum of 120 days.

The longest period used in the trials was 120 days. This is the minimum period of stratifiication for sandcherry, wild plum, and black walnut and a longer period may possibly result in even better germination. (Project 174. Horticulture-Forestry Dept.)

New Publications

C141 An Improved Farm Rental Method for South Dakota, by Russell L. Berry

A new farm lease that combines the main features of both cash and share-rent leases is included with this circular. The circular tells how to use the form and gives the advantages of this type of leasing system.

C142 Planning a Father-Son Farm Partnership, by Charles H. Benrud

Advantages of father-son farm partnerships are discussed in this publication and important considerations which are necessary if the partnership is to succeed are outlined. A copy of a suggested partnership agreement is included.

These publications are available through your County Agent. They can also be obtained by writing to: Bulletin Room, Agricultural Experiment Station, South Dakota State College, College Station, Brookings, S. Dak.

asparagus

can be nutritious and delicious

By **Lida M. Burrill,** home economist, and **Beth Alsup,** former assistant home economist

MANY OF US eagerly look forward to those first spears of asparagus poking through the ground in our gardens. For us, this vegetable provides a welcome treat.

To be sure, frozen asparagus is usually available the year around. But good as the frozen product is, it is not in the same class with asparagus harvested at the ideal stage of growth, hustled from plot to pot, and from pot to plate.

Besides being a delicious vegetable, garden-fresh asparagus is a good source of nutrition. One-half cup (100 grams) of the fresh, raw vegetable contains on the average 33 milligrams of ascorbic acid (vitamin C). This is about half the National Research Council's recommended daily allowance for adults.

The same serving will also give you about 1,000 International Units of vitamin A in the form of carotene, about one-fifth of the recommended daily allowance.

Loses Quality Rapidly

Asparagus, unfortunately, loses flavor and texture rapidly. That is

why "fresh" asparagus in food stores often has poor quality.

Does asparagus lose its nutritional value as quality goes down? Could such losses of quality or nutritive value be slowed down by proper handling during marketing and in the home? These questions led to this study.

Study in Three Parts

The study was set up in three parts: (1) a comparison of the quality and nutritive value of asparagus from different sources, (2) changes in nutritive value during refrigerator storage, and (3) development and testing of recipes using asparagus.

Compare Quality. In the first part of the study, we secured raw asparagus from the Horticulture Department garden at State College, from a local market garden, and from each of six retail food stores in Brookings. Each lot of asparagus was rated for quality by our Home Economics research staff. We also analyzed each sample for ascorbic acid, carotene, and moisture content as soon as possible.

Results are summarized in the table. You can see that all but one of the lots from the Horticulture Department garden and the local market garden were rated excellent in quality. One sample had short stalks and was rated very good. On the other hand, none of the asparagus from the food stores was rated higher than good, and a number of them rated fair to poor.

The table also shows that the carotene content of the asparagus varied widely, from 288 to 804 micrograms in 100 grams of the raw vegetable. However, carotene content did not seem to be connected with quality score.

Amounts of ascorbic acid found in these samples ranged from a high of 50 to a low of 5 milligrams per 100 grams. Although there was some overlapping, asparagus rating fair to poor usually had the lower amounts while samples rating higher had higher amounts.

Except for two samples from store No. 4 and one from store No. 6, all samples of asparagus from the food stores were much lower in ascorbic acid content than asparagus from the Horticulture garden and

Quality Rating and Average Ascorbic Acid and Carotene Content of Asparagus from Different Sources

Source	Quality Rating	Ascorbic Acid Content, mg./100 g.		B-Carotene Content, mcg./100 g.	
		Range	Average	Range	Average
Horticulture Department	Very Good to Excellent	32–47	39	346–777	513
Market Garden	Excellent	36–50	44	366–804	507
Food Stores	1. Good	10–12	11	.....	459
	2. Poor-Fair	5–7	6	.....	.....
	3. Fair	.....	14	.....	704
	4. Good	40–41	40	.....	998
	5. Fair	10–23	16	362–581	502
	6. Good	16–33	28	288–584	485

the market garden. These two stores received their asparagus from the market garden for resale, which probably accounts for their high scores.

One sample from store No. 6, which had been carried over only 1 day, had a lower ascorbic acid content (16 mg./100 g.). This shows clearly the nutritional advantage you will get by growing asparagus in your own garden.

Check Changes in Storage. In the second part of the study, we checked the changes in ascorbic acid content of asparagus following a 10-day storage period.

To begin with, we secured 8 to 10 pounds of freshly-harvested asparagus from the local market garden. Three samples were taken for immediate checking of moisture and ascorbic acid content. The rest was divided into three lots.

One lot was placed in an uncovered pan, one in a covered pan, and one in a polyethelene plastic bag inside a covered pan. All three lots were stored in the same refrigerator which was kept at 40° F. During the 10-day period, we analyzed the samples five or six times.

None of the methods was superior. In fact, there were losses of ascorbic acid from an average of 48.6 to 19.3 milligrams per 100 grams, or a loss of about 60%. From this, you can see why you should use asparagus as soon after harvest as possible if you want full flavor and ascorbic acid value.

Grow Asparagus in Your Garden

Growing asparagus in your own garden is the best way to be sure of having a fresh supply. You can use it immediately after harvest or freeze it for later in the year.

Asparagus grows exceedingly well in South Dakota. It needs little extra work. Mary and Martha Washington are the two most popular varieties. Both are excellent for freezing.

You should plant enough asaparagus to supply your family during the entire season. Suggestions range from six to ten plants per person or about 24 to 36 plants for a family of four. When you plan an asparagus bed, be sure to allow a few extra plants for freezing a package or two at each cutting. You could also freeze one whole cutting at one time.

Freeze only the tender, succulent stalks. It is always nice to keep some as "tips" or "spears." The remaining tender cuts can be used in many ways, as in soups or with cream sauce.

Scald Before Freezing

As with other green vegetables, asparagus should be scalded and chilled before freezing to preserve natural color and flavor. You can do this by boiling in water for 2, 3, or 4 minutes for small, medium, or large stalks. Allow 1 gallon of water for each pound of vegetable being scalded at one time.

Thorough chilling should follow immediately. Tips or spears are easier to handle if you tie them in bundles before scalding. Cut them apart before packaging. Flat-shaped containers are best for asparagus spears. Any good moisture-vapor-proof container may be used. Work as fast as you can to get the asparagus in the freezer as soon as possible after harvesting.

Develop and Test Recipes

The final phase of the study was to develop and test recipes using asparagus. Here are several special recipes you may want to try. You can use fresh, frozen, or canned asparagus.

☆ ☆ ☆

Asparagus Pudding
(Serves 6)

Beat slightly:
- 3 eggs

Add and mix well:
- ½ tsp. salt
- pinch of cayenne pepper
- pinch of nutmeg

Add:
- 2 cups cooked asparagus (cut into 1-inch pieces)
- 2 Tbsp. melted butter

Pour mixture into greased 1 qt. baking dish or 6 to 8 custard dishes. Place in shallow pan of hot water and bake at 350° F. for 40 to 50 minutes or until custard is completely set. Test by inserting blade of table knife into center of pudding. If blade of table knife comes out clean the pudding is done.

Serve in baking dishes or turn out on serving plate.

☆ ☆ ☆

Asparagus Casserole (Bacon)
(Serves 6)

Prepare and cook:
- 1 lb. asparagus (or use a 1 lb. can)

Fry until almost crisp:
- ½ c. bacon slices (cut-up) or ½ c. diced ham

Brown in bacon drippings:
- ½ c. ground beef

Pour off into a second skillet:
- 3 Tbsp. bacon drippings

Add and stir until smooth, then cook until thickened, stirring constantly:
- 3 Tbsp. flour
- ¼ tsp. salt
- ⅛ tsp. cayenne pepper
- 1½ c. milk

Add:
- ½ c. grated sharp cheese

Put layers of the vegetable, meat, and cheese sauce in greased 1 qt. baking dish.

Top with:
- ¼ c. bread crumbs

Bake at 375° F. (mod.) for 25 minutes.

☆ ☆ ☆

Asparagus Pie
(Serves 8)

Bring to boiling point (do not boil), and then let stand. Strain before using:
- 2 c. heavy cream or { 1½ c. evaporated milk + ½ c. asparagus juice + ¼ Tbsp. dry milk }
- 1 large bay leaf
- 4 thin slices onion
- pinch of thyme
- pinch of oregano or majoram

Heat in saucepan:
- 1 Tbsp. butter

Add and cook until slightly brown:
- 2 cans chopped veal (baby food)

Add the strained cream sauce mixture to the meat and butter. Bring to a boil and cook slowly until slightly thickened (about 15 minutes). Prepare and cook:
- 1 lb. asparagus spears (or use a 1 lb. can of asparagus spears).

Line bottom of a 9- or 10-inch baked pie shell with half of the asparagus with heads away from the center (or use the lower parts of longer spears). Pour a thin layer of sauce over them. Arrange the remaining spears with heads toward the center. Cover with remainder of the sauce, leaving the heads of the asparagus exposed.

Top with:
- ½ c. fine bread crumbs

Sprinkle with:
- ½ c. Parmesan cheese

Brown quickly under broiler.

Asparagus Pie

Spaghetti Ring with Asparagus and Eggs

Spaghetti Ring with Asparagus and Eggs

(Serves 8 to 10)

Cook until tender:

1 package spaghetti (2 cups, uncooked)
2 qts. boiling water
1 Tbsp. salt

Drain and combine with:

1 c. cooked, ground beef liver
1 tsp. garlic salt
2 Tbsp. pimiento, chopped
¼ tsp. pepper
4 eggs (beaten)
¾ c. whole milk or light cream

Pour into buttered ring mold, place in pan of hot water and bake in moderate oven (350° F.) for about half an hour, or until firm enough to hold its shape when turned out on a platter.

To make the filling:

Melt:

2 Tbsp. butter

Carefully blend in:

2 Tbsp. flour
½ tsp. salt
¼ tsp. pepper
1½ c. milk

Cook slowly, stirring constantly, until mixture thickens.

Add:

2 c. cooked, cut asparagus

Pour hot filling into center of spaghetti mold.

Garnish with:

2 hard-cooked eggs, sliced

Bacon strips, crisply fried, and parsley may be arranged on the platter around this ring.

Asparagus and Almonds

Spread alternate layers of cooked, cut-up asparagus, chopped, blanched, toasted almonds and cheese sauce in greased baking pan.

Top with bread crumbs and chopped almonds.

Bake 20 minutes at 350° F.

The cheese sauce may be made from a medium white sauce base with either grated American or sharp cheese added; or a quick cheese sauce may be made with a soft processed cheese and milk.

Medium white sauce recipe:

2 Tbsp. butter, melted in a saucepan
2 Tbsp. flour
Dash of salt
1 c. milk

Stir and cook slowly until sauce thickens.

Then add and stir until blended.

¼ to ½ c. grated American or sharp cheese.

Asparagus Luncheon Platter

Cook 2 lb. asparagus spears in salted water until tender.

Combine and heat to the boiling point:

1 can condensed cream of mushroom soup
½ c. light cream or top milk
1 tsp. lemon juice — Salt
1 egg yolk (beaten) — Pepper

Drain asparagus; arrange on 6 slices of toast.

Pour sauce over asparagus.

Asparagus Casserole (Mushroom)

Cook and place in greased 1 qt. casserole:

1 lb. fresh asparagus (or use 1 lb. can of asparagus pieces or spears).

Cover with:

1 can mushroom soup
Bread crumbs or cracker crumbs

Top with:

1 Tbsp. butter, dotted on the crumbs
½ c. grated American or sharp cheese

Bake in moderate oven (375° F.) for 15 to 20 minutes, or until browned on top and sauce has slightly thickened.

(Project 210. Home Ec. Dept.)

soil surveys provide valuable information

SOIL NAMES such as Kranzburg silt loam or Bonilla-Houdek loam may not mean much to the average South Dakotan—unless he lives in an area where the soils have been surveyed.

Names help identify a soil's make-up just as a farmer associates certain characteristics with a particular breed of livestock or a crop variety. Instead of describing a soil as a deep, dark, silt loam developed from wind-blown silt over glacial till, one can refer to it as Kranzburg silt loam.

Today many South Dakotans can consider the specific soil types and how they react as they plant their crops, appraise land, plan irrigation or drainage, or lay out highways. They get their information through soil surveys.

Soil surveys determine the types of land in a particular area. They consist of a map that shows the distribution of the soil types in relation to other features of the earth's surface and a report that describes the soils and predicts their behavior.

Farmer Gets Map of His Land

Here's how a farmer uses the survey. He receives a publication through his county agent or Soil Conservation Service officer. It includes a map that shows the locations of the various types of soil on his land. There are also tables that predict the yields of different crops on the various types of soil. The publication also indicates the response to fertilizer and adaptability to irrigation. From this information the farmer, working alone or with the assistance of the county agent or Soil Conservation Service officer, can figure out a cropping plan to make the best use of each soil involved on his farm.

Soils may very greatly, even over one farm. And various kinds of soils behave differently and require different management for the best performance.

Surveys are made on a county basis. Every one made in the state is cooperative between the South Dakota State College Agricultural Experiment Station and the Soil Conservation Service. Where Indian reservations are concerned, the Bureau of Indian Affairs or the Missouri River Investigation Agency is also involved. The Bureau of Reclamation, which makes surveys for irrigation, also cooperates.

Recent surveys have been completed or are nearing completion in Brookings, Clay, Codington, Day, Haakon, Hamlin, Hand, Jerauld, Lincoln, Minnehaha, Potter, Spink, and Turner counties. Beadle, Brown, Douglas, Grant, Hyde, McCook, Moody, Union, and Walworth counties have older surveys.

Surveys Are a Big Job

There's a lot more to a soil survey than one is apt to realize. Soil scientists make the soil maps by walking across the fields and systematically observing the soil characteristics at the surface and to a depth of 60 inches or more to see what underlies the topsoil.

After the soils are classified and their boundaries plotted, they are compared with soils already defined in a nation-wide system of classification. If a new soil series is found, it is named after some nearby geographic feature. It's hard to know how a soil will perform for sure until its characteristics are cataloged by a system of soil classification. In this way, whatever has been found about this soil anywhere can be applied.

Researchers conduct fertilizer field trials for two, three, or more years in the survey area to get an idea of crop response to fertilizers. They also get valuable information from county agents and from farmers who have kept yield records on each field along with rotation and fertilizer application information.

Surveying takes time. Under ordinary conditions, two men can survey an average county in 3 to 5 years. One man can field survey about 400 acres a day in eastern South Dakota. In range areas the survey need not be quite as detailed and it goes somewhat faster. Add to this the job of correlating the soils, making the prediction tables, and finally publishing all the information, and it amounts to a lot of work.

Many People Receive Benefits

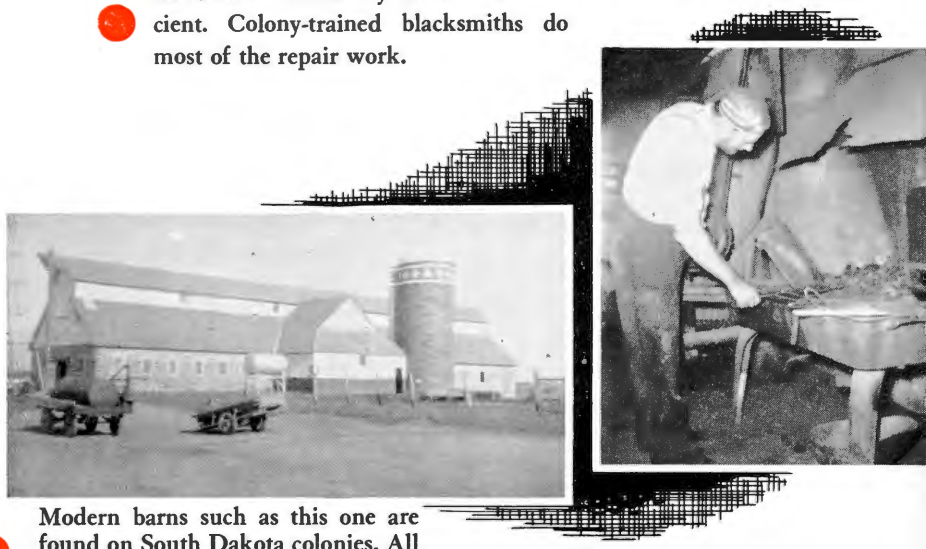
Soil surveys furnish a link between research and the farmer. The main practical purpose of soil surveys is to provide a basis for the study of soil relationships. The idea is to increase productivity and to help in soil conservation and reclamation.

But their use extends beyond that.

Soil surveys can be used to establish comparative evaluations for equitable tax assessments. They can give preliminary information on the irrigation possibilities of an area. They can be valuable in engineering studies for dams, highways, or airports. They can supply information on suitable sites for trees and for establishing wildlife and recreation areas. They can serve a purpose in real estate investments, farm loan appraisals, and public land acquisitions.

Soil surveys in South Dakota are classified as "old series" and "new series." The old series surveys were made prior to 1929. The maps were made on a small scale and without benefit of an aerial photo base map, and the report describes the soils but doesn't interpret them.

The new series surveys have been published since 1947. The field mapping for these surveys has been done on aerial photo base maps and an accompanying bulletin provides interpretation for the soils mapped.



Hutterite colonies try to be self-sufficient. Colony-trained blacksmiths do most of the repair work.

Modern barns such as this one are found on South Dakota colonies. All colonies in the state raise livestock.

By **Marvin P. Riley,** associate rural sociologist, and **David T. Priestley,** graduate assistant

AGRICULTURE ON SOUTH DAKOTA'S

SOUTH DAKOTA is the home of part of a small religious group known as Hutterites. This society originated in central Europe during the Protestant Reformation (1528). Present-day members of this group live on communal farms located in eastern South Dakota, Montana, Washington, and Canada.

The history and religious beliefs of the Hutterites are described in "Communal Farmers—the Hutterite Brethren," *South Dakota Farm and Home Research,* November, 1956. Their beliefs give the Hutterite colonies the unity and stability around which their way of life is integrated. Principles such as "community of goods" provide the basis for their colony living, communal ownership of property, and farm organization. This article describes briefly one phase of Hutterite activity—the agricultural enterprises of the present-day South Dakota colonies.

Census and Land Holdings

A survey of the South Dakota colonies showed that in 1957 there were 1,870 Hutterites living in 17 colonies. These persons comprised 270 families with an average size of seven persons. Farmland operated by the South Dakota colonies in 1957 totalled approximately 79,000 acres. Nearly 68,000 acres were owned, and about 11,000 acres

were rented or leased from non-Hutterite land owners.

Data from the 1957 survey show that the "average" colony had about 16 families with a total of 110 persons. This average colony operated 4,640 acres, 660 of which were rented. Similar to most other farms in South Dakota, all of the land which the colonies operated was not cropland. Only about 57% of the total land they operated in 1957 was in crops. One-third of the land was pasture and 10% was hayland.

Because Hutterite colony land is owned and operated by the members of the colony working cooperatively, it is not possible to determine acreages operated by separate families or individuals. However, statistical averages indicate that each family operated 291 acres, or about 42 acres per person, in 1957. Although the data are not precisely comparable, federal agricultural census information suggests that the acreage operated per Hutterite family is smaller than the average size farm in the same sections of the state.

nmunal farms

Rules for Practical Living

To acquaint you with the farming practices and production of the Hutterites, three principles which guide their day-by-day activity should be explained. These principles are derived from their religious beliefs and serve as general rules for everyday life. First, Hutterites attach considerable importance to the principle of "self-sufficiency." Each colony attempts to be as self-sufficient as possible by producing most of the goods and services it uses. Diversification of colony enterprise is one result of application of this principle. Another principle, "simplicity of living," further contributes to self-sufficiency by limiting the needs and demands of the Hutterites primarily to what can be produced in the colony. The third principle, "efficiency," encourages them to accept changes in farming practices. It also helps to explain the extensive use of labor- and cost-saving devices in livestock and poultry production.

Live in Colonies

Hutterites live in small agricultural villages, or colonies. Each colony headquarters consists of a large cluster of buildings located somewhat centrally on their land. The arrangement of the buildings follows a functional pattern. Residences, communal dining hall, church, and school are in the center. Partly surrounding this area are the shops for maintenance facilities. A short distance beyond are the granaries and the barns and sheds for livestock and poultry.

Work Organization

The nature of colony organization permits the Hutterites to engage in many farming enterprises.

The older, more responsible men of the colony serve as department heads in charge of the various farm enterprises, such as crops, cattle, and poultry. Work is organized so each department head is responsible to the colony business manager. The colony labor supply is divided among the various departments. Each department head may have working under him an assistant and one or more helpers, depending on the size of the enterprise. This arrangement allows flexibility in the use of manpower. When the work requirements of the departments change during the year, men can be shifted to where the demand is greatest.

Although election to the position of department head is usually annual, a capable man may be reelected time and again. After years of experience in an enterprise, visiting with feed company salesmen, and reading articles in farm journals, most department heads become "specialists" in their field.

Agriculture is Mechanized

The Hutterites have mechanized their agriculture. As a colony, it is possible to arrange their cropland into large fields to make extensive use of power equipment. Thus, they can use track and diesel tractors to pull plows with as many as nine 14-inch bottoms or three subsoilers hitched in tandem.

To improve and increase production and efficiency, the Hutterites are willing to try new developments in farm techniques and machinery. Although exceptions may be pointed out, the Hutterites can be considered among the farmers who attempt to keep up-to-date in their farming practices.

Farming Practices

Generally speaking, the Hutterites seem to have recognized the need for soil conservation and reconditioning early in their settlement in South Dakota. They presently use subsoilers and disc plows to conserve both soil and moisture. Crop rotations have been practiced for many years. Commercial fertilizers are used. Livestock production provides them with manure for their land.

However, even with their high

(Top) Tandem-hitched subsoilers rapidly plow cropland while preserving both soil and moisture.
(Bottom) Irrigation makes possible higher corn production for some colonies.

Turkey production is an important enterprise in many colonies.

degree of mechanization, extensive crop rotation, and liberal use of fertilizers, the Hutterites have felt themselves caught in a situation of declining prices and increasing costs. They feel that their agricultural production must be fed to livestock and poultry before they can realize significant gains. This conclusion, supported by their principles of self-sufficiency, simplicity of living, and efficiency, encourages them to specialize to some extent in one or two of their basic enterprises.

Diversification of Enterprises

All of the colonies are operated on an agricultural base. Without this, little other production would be possible. Although there is variation between colonies each produces quantities of nearly all types of livestock and poultry.

All colonies raise cattle, hogs, and chickens. Each colony has a dairy herd. Nearly all of them have flocks of ducks and geese. Most of the colonies also raise sheep. Eleven colonies produced turkeys for market in 1957, but two indicated that they might discontinue this enterprise.

Part of this production is used for their own consumption, and part of it is sold. Beef, mutton, poultry, and pork are used in their diet. Feathers from ducks and geese are used for bedding. Milk from their dairy herds is used in cooking, for drinking, and for making butter and cheese. Most colonies keep bees and the honey is commonly used in place of sugar and syrup.

In their livestock and poultry feeding, the Hutterites use their own forage and field crops whenever possible. Colonies that are more extensively engaged in hog or turkey production make feeds by grinding and mixing their own grains to which they may add commercial supplements.

Top Enterprises

In a survey made at the end of 1957, each colony indicated the rank order of its three top income enterprises for that year (see table). Livestock enterprises are the most important throughout the colonies.

Rank of Three Top Income Enterprises for South Dakota's Hutterite Colonies 1957

Enterprises	Rank 1	2	3	Total
Livestock	7	14	9	30
Cattle	1	5	6	12
Hogs	4	8	2	14
Sheep	2	1	1	4
Poultry	6	1	3	10
Turkeys	6	—	2	8
Chickens	—	1	1	2
Dairy	—	2	1	3
Grain	4	—	4	8

Nine colonies included **both** hogs and cattle in the top three. Three colonies depended upon **all three** types of livestock (hogs, cattle, and sheep) as principal income sources.

In poultry production, the raising of turkeys is increasing in importance among the colonies. Eight of them count it among the three top income enterprises. South Dakota's Hutterites raised more than 300,000 turkeys in 1957, about half the total production for the state that year. Chickens provide a significant income for two colonies from the commercial sale of eggs or meat.

Although the colonies use most of their corn and small grain crops for feed for their livestock and poultry, eight of them consider the sale of small grains as one of their three main income sources. Dairying is becoming an important source of income for the colonies.

It is not intended to give the impression that there is a standard pattern of production among the colonies. Although the material presented here is generally applicable, each colony is distinctive in the arrangement and the importance of its major enterprises. There is considerable variation among them which average figures tend to hide. For example, although the average size of colony was 4,640 acres in 1957, they ranged in size from 6,700 to 3,200 acres. Population varied from 160 to 70 persons. Beef production varied from 540 to 120 head per colony.

Changes in Enterprises

The process of change has not passed by the Hutterites. Specialization of enterprises is increasing within the colonies. It is in hog and turkey production that the mechanization and efficiency of the Hutterites is best seen. Multiple-farrowing (breeding so there are three or more farrowings a year) is only recently growing in importance among hog producers. A few of the colonies seem to have been practicing this for many years. Such a plan permits the more efficient use of equipment and buildings since they do not stand idle for any length of time.

One of the newer industries among the colonies is turkey raising. A few of the colonies that are producing turkeys hatch the eggs themselves. At present eggs are purchased from commercial sources, but some of them are considering establishing breeding flocks. Most of them have large heated barns and range feeding facilities. The turkeys are sold live to packing company buyers when they are ready for market.

Many things about the production of the Hutterite colonies can perhaps be criticized by neighbors and agricultural specialists. Nevertheless, the Hutterites are willing to improve the quality of their production, willing to learn better techniques, and willing to make the technological changes necessary to continue their successful agricultural enterprises. Their three principles of self-sufficiency, simplicity of living, and efficiency support them in making such necessary changes, because it is around these principles that their agricultural and livestock production is organized. (Project 255. Rural Sociology Dept.)

1959 RECOMMENDED VARIETIES

Eligible for Certification

Spring Wheat
- Conley
- Lee
- Rushmore
- Selkirk

Durum Wheat
- Langdon
- Ramsey
- Yuma

Winter Wheat
- Cheyenne
- Minter
- Nebred

Oats
- Andrew
- Burnett
- Cherokee
- Dupree
- Garry
- Marion
- Mo-O-205
- Minhafer
- Newton
- Ransom
- Rodney
- Waubay

Barley
- Custer
- Feebar
- Kindred
- Liberty
- Plains
- Spartan
- Traill

Flax
- Arny
- Bolley
- Marine
- Redwood
- Sheyenne
- B-5128

Soybeans
- Blackhawk
- Capital
- Chippewa
- Ford
- Grant
- Harosoy
- Hawkeye
- Lindarin
- Ottawa Mandarin

Rye
- Antelope
- Caribou
- Pierre

Grain Sorghum
- Dual
- Norghum
- R. S. 501
- Reliance

Forage Sorghum
- Dual
- Piper Sudan
- Rancher
- 39-30-S

Alfalfa
- Cossack
- Grimm
- Ladak
- Narragansett
- Ranger
- Rhizoma
- Teton
- Vernal

Sweet Clover
- Goldtop
- Madrid

Red Clover
- Dollard

Foxtail Millet
- Manta

Tomatoes
- Siouxann
- State Fair

Birdsfoot Trefoil
- Empire

Smooth Bromegrass
- Homesteader
- Lancaster
- Lincoln

Crested Wheatgrass
- Fairway
- Nordan

Intermediate Wheatgrass
- Approved Certified Varieties

Pubescent Wheatgrass
- Mandan 759

Tall Wheatgrass
- Approved Certified Varieties

Switchgrass
- Nebraska 28

Russian Wild Ryegrass
- Mandan 2355

Green Needlegrass
- Green Stipagrass

Side-Oats Grama
- Butte

Needle Ricegrass Hybrid
- Mandan Ricegrass

Trees
- Chinkota Elm
- Harbin Pear
- Siouxland Cottonwood

For recommended corn hybrids for your area, see Agronomy Pamphlet 46, 1958 Corn Performance Tests, or write to the Agronomy Department

Varieties eligible for certification, listed above, have been tested by the South Dakota State College Agricultural Experiment Station. They are recommended in areas where they are adapted. For information about variety recommendations for your area, contact your County Agent or write to the Extension Service, South Dakota State College, College Station, Brookings, South Dakota.

By **R. L. Larson**, graduate assistant, **F. W. Whetzal**, assistant animal husbandman, and **L. B. Embry**, animal husbandman

blood clotting time in cattle fed alfalfa hay

OCCASIONALLY WE RECEIVE reports that cattle being fed alfalfa hay bleed excessively, and death losses may result from dehorning. We have not felt that feeding alfalfa hay causes any particular problem at dehorning. Other experiment stations do not appear to have reported a bleeding condition attributed to feeding alfalfa hay.

Since we were conducting experiments in which calves were fed various amounts of alfalfa hay, we decided to investigate the effects of these rations on blood clotting time and bleeding time following dehorning.

Hereford Cattle Used

The cattle used in this study were wintered at the Range Field Station, Cottonwood, and North Central Substation, Eureka. Four lots of ten grade Hereford steer calves each were started on winter feeding trials at each station in early January 1958. Both trials lasted 145 days.

Alfalfa hay and prairie hay harvested during the summer of 1957 were fed in the winter feeding trials. The hay was baled and stored in large stacks in the open without cover. The prairie hay at both stations and the alfalfa hay at Cottonwood were about average quality. Good to excellent quality alfalfa hay was fed at Eureka.

The outside storage resulted in some weather damage to the hay, especially the outer bales of the stack. There was no sweet clover in the alfalfa hay at either substation.

Cottonwood Rations. The rations fed to the four lots of calves contained 10, 30, 50, and 70% alfalfa hay, the remainder being prairie hay. All lots were fed the same amount of total hay. Trace-mineralized salt and a mineral mixture composed of equal parts trace-mineralized salt and bone meal were offered free choice. Water was available at all times in heated automatic waterers.

Eureka Rations. Calves at the Eureka substation were fed alfalfa and prairie hay, and all the rations contained 25% whole oats. The roughage portion of the rations was composed of 0, 25, 50, and 75% alfalfa hay, the remainder being prairie hay. Mineral supplement and water were supplied in the same manner as at Cottonwood.

Blood Cotting and Bleeding Time Determined

An area of one ear was clipped free of hair and cleaned with cotton soaked in ethyl alcohol. The area was allowed to dry and an ear vein was punctured. The blood was allowed to flow for a short time, and a sample was then collected in a coagulation tube.

Time was measured with a stop watch from the instant the tube was filled until the blood clotted. The time of clotting was determined by breaking off short pieces of the tube at regular intervals of time until a thin string of clotted blood extended between the two pieces of broken tubing. Two samples were collected from each animal to check the experimental technique. Good agreement was obtained in clotting time between the two samples.

The cattle at the Cottonwood substation were dehorned during the early part of the winter feeding trial, and only clotting time was obtained with them. Blood clotting time was determined 11 days before the termination of the winter feeding trial.

The cattle at Eureka were trucked to Brookings when the winter experiment was terminated. The blood clotting time was determined 9 days later, but they were fed rations similar to those fed during the winter. Some of these calves had not been dehorned, and dehorning was done by sawing on the same day the blood clotting time was determined. Time was recorded for each animal from dehorning until the blood ceased to flow from the dehorning wounds.

Results

Cottonwood. The blood clotting time of cattle fed various amounts

This steer was fed alfalfa hay prior to being dehorned. The experiment indicated that feeding alfalfa hay does not affect bleeding following dehorning.

Table 1. Blood Clotting Time of Calves Fed Different Amounts of Alfalfa Hay—Cottonwood, May 16, 1958

	Alfalfa Hay in Ration, %			
	Lot 1 10	Lot 2 30	Lot 3 50	Lot 4 70
Calves per lot	10	10	10	10
Av. wt. off winter trial, lb.	531.4	548.0	562.0	575.6
Days on feed	134	134	134	134
Average daily winter ration, lb.				
Alfalfa hay	1.31	3.92	6.53	9.15
Prairie hay	11.77	9.15	6.53	3.92
Blood clotting time, sec.				
Av. per lot	286.6	157.6	102.9	99.4
Range	160-375	100-225	92-112	92-105

of alfalfa hay is shown in table 1. A rather large difference was obtained between lots in average blood clotting time. There were also large differences among animals in the same lot for lots 1 and 2. The difference in the range in these lots and in lots 3 and 4 is not known, but a more constant temperature during time of sampling might be a factor. All values are low in comparison to the time considered normal for cattle (6½ minutes).

A decrease in the blood clotting time was obtained with increasing amounts of alfalfa hay in the ration. However, the values reflect time of day and environmental temperature when sampled as well as the amount of alfalfa hay fed.

The cattle were handled by lots in the order of lot 1 through lot 4. The sampling period extended from about 8 a.m. to 12:30 p.m., and the environmental temperature increased as the day progressed. Blood clots faster as it gets warmer. Differences in environmental temperature readily affect the temperature of the blood in the small coagulation tubes. This is probably the main reason clotting time decreased from lots 1 to 4.

Eureka. Blood clotting time and bleeding time following dehorning are shown in table 2. The sampling and dehorning were done in the afternoon from about 1:30 to 5:30. To overcome the effects of change in temperature on the sampling technique during the afternoon, one animal was taken from each lot in rotation. Blood clotting time was noted to increase as the afternoon progressed and the temperature became cooler. However, this effect was balanced between lots by the sampling procedure used.

The data presented in table 2 show only small differences in average blood clotting time among lots. The range among animals in the same lot was large but again low in comparison to normal values for cattle. The results show the amount of alfalfa hay in the ration apparently did not affect the blood clotting time.

The bleeding time following dehorning (see table 2) shows no consistent trend correlated with the amount of alfalfa hay in the ration. The average bleeding time for all lots is rather short in that it represents the total average time any blood was flowing from the dehorning wounds. Time for the squirting blood would have been shorter. The bleeding time did not appear to be excessive for any lot. Nothing was done to hasten the stoppage of bleeding.

Summary

Blood clotting time on 78 Hereford steer calves and bleeding time following dehorning on 22 of these calves were obtained after the calves had been wintered on rations containing from none to 75% alfalfa hay. The amount of alfalfa hay in the ration did not appear to affect the blood clotting time or the bleeding time following dehorning. The average clotting and bleeding times were relatively short with all the rations fed. Two sources of alfalfa hay which had been harvested during the previous summer and stored in large stacks in the open were used in the experiment.

The alfalfa hay used in this experiment did not contain sweet clover. A large amount of sweet clover is sometimes present in alfalfa crops in some areas of the state. Moldy sweet clover hay or silage has been shown to prolong the clotting time of blood enough to cause animals to bleed to death when a blood vessel is cut or ruptured. This condition is referred to as "sweet clover disease" and could occur when a large amount of sweet clover is present in the alafalfa hay. (Project 325. Animal Husbandry Dept.)

Table 2. Blood Clotting Time and Bleeding Time Following Dehorning of Calves Fed Different Amounts of Alfalfa Hay—Eureka, May 27, 1958

	Alfalfa Hay in Roughage Portion of Ration, %			
	Lot 1 0	Lot 2 25	Lot 3 50	Lot 4 75
Calves per lot	9	10	10	9
Av. wt. off winter trial, lb.	594.4	604.0	587.9	607.8
Days on feed	154	154	154	154
Av. daily winter ration, lb.				
Alfalfa hay	—	2.89	5.77	8.65
Prairie hay	11.45	8.65	5.77	2.89
Whole oats	3.8	3.8	3.8	3.8
Blood clotting time, sec.				
Av. per lot	193.7	207.7	193.0	192.4
Range	101-316	110-305	100-366	106-465
Bleeding time following dehorning, min.				
Number dehorned	5	5	5	7
Av. per lot	12.0	20.4	10.1	16.7
Range	6-16	8-30	5-15	8-32

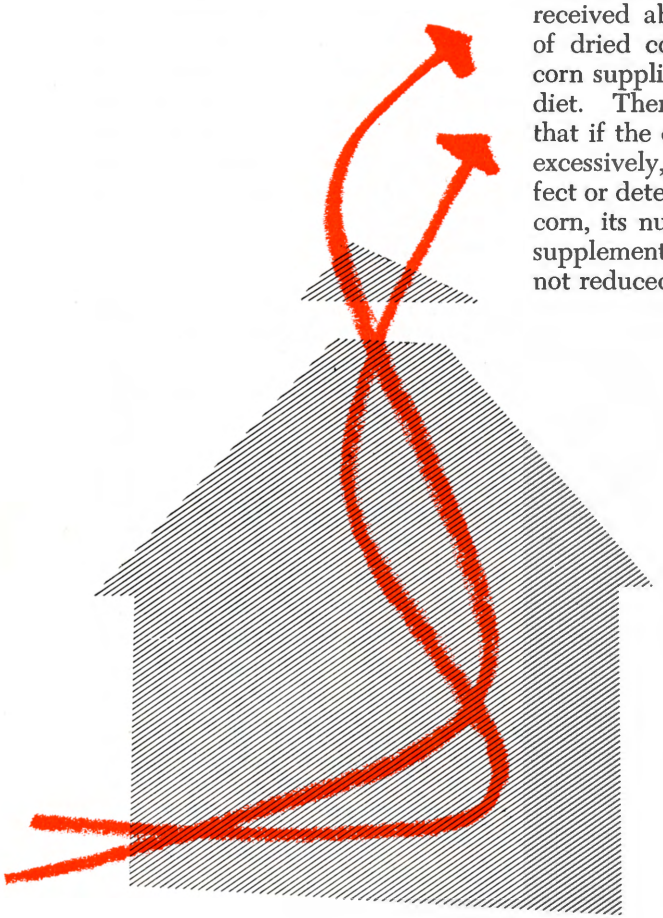
GOOD QUALITY CORN CAN BE DRIED ARTIFICIALLY WITH AIR TEMPERATURES OF AS HIGH AS 255° F. AND BE AS GOOD FOR POULTRY AS NATURALLY-DRIED CORN

By **C. W. Carlson,** poultryman; **B. J. Bonzer,** extension poultryman; **R. J. Emerick,** assistant biochemist; and **H. L. Winterfeld,** assistant agricultural engineer

the effect of drying

MUCH OF THE CORN produced in South Dakota in 1957 was artificially dried before it was added to commercial feeds, particularly that used for poultry.

As a result, many inquiries were received about the nutritive value of dried corn. For the most part, corn supplies energy to the poultry diet. Therefore, it was stated that if the corn had not been dried excessively, causing a browning effect or deterioration of the starch in corn, its nutritive value for a well-supplemented poultry ration was not reduced.



It seemed obvious that if drying had been excessive and produced a lot of scorched kernels, the corn's energy value would be reduced. Corn that is immature or damaged shows up as dark kernels after being dried and does not have the feeding value of high quality corn.

However, no specific information was available on the question. Only a few studies, at the Nebraska Experiment Station and by the USDA, have been conducted on the influence of drying corn.

Because of the lack of information, studies were undertaken here to determine if the artificial drying of corn affects its nutritive value and what the effects of drying temperatures are on its nutritive value. Four studies were conducted, three with chicks and one with rats. For the chick studies, various types of corn made up about 50% of the starter ration. Corn made up 80% of the ration in the rat study. Chicks were grown to 4 and 8 weeks of age; the rats were started on experiment at weanling age and continued for 4 weeks.

on the nutritive value of corn

Several Types of Corn Used

For the first two chick studies, old, naturally dried corn was compared with the commercially dried corn used in preparation of most of the poultry feed fed here last year. In the third chick study, the commercially dried corn was compared with soft corn that had been dried from about 25% moisture to about 12% at various air temperatures, ranging from room temperature (about 70° F.) to 255° F. This corn was dried in 100 pound lots. It was spread out about 3 to 4 inches deep on trays and placed in large ovens.

For the study with rats, corn at about 18% moisture was compared with other lots of the same corn dried over a similar range of temperatures. At the higher temperatures drying was somewhat excessive, because of the smaller sized lots dried for the rats.

Differences are Small

In the first two chick studies only very small differences in growth rates were obtained. There were no definite trends, and the conclusion was that the new crop corn dried artificially was just as good for poultry as the old corn.

In the third chick study there were no differences in growth rates. It is not likely that much corn is or was dried at air temperatures above 200° F., so temperature ranges used in this work cover most of the possibilities that could exist.

That excessive drying may be detrimental was just hinted at by the results of the rat study. Though

there were no significant differences in growth, there was somewhat poorer growth with the corn dried at 250° F. This lot of corn had been dried excessively, as evidenced by the much lower moisture content (about 6%) and that may have accounted for the tendency towards a slower rate of growth and poorer feed efficiency. On an equivalent moisture basis, the wet corn was just as efficient as the various lots of dried corn in promoting rat growth.

Proper Drying Not Harmful

Corn of good quality containing up to 30% moisture may be dried at temperatures up to 255° F. and be just as good for poultry as old, naturally dried corn. If the moisture content is driven below about 8% as a result of excessive drying, it is probable that some nutritive quality will be destroyed.

However, if you are assured that the corn has been dried properly and is of good quality, do not be unduly concerned about using it. Great care is taken by most feed manufacturers to add excess vitamin levels and adequate protein and mineral supplements to poultry feeds, so corn is relied upon mainly for energy. This was true for the studies discussed here, and on that basis, artificially dried corn of high quality is every bit as good for poultry as naturally dried corn.

If you are going to rely on corn to supply a large proportion of the protein (as for laying hens) and vitamin supplementation is low, some lots of artificially dried corn showing signs of excessive drying may not be as valuable as naturally dried corn. If the vitamin supplementation is adequate, though, good quality artificially dried corn is probably safe to use in these cases also. (Project 241. Poultry Dept. Corn dried by Agricultural Engineering Dept. and rat study conducted by Station Biochemistry Dept.)

AGRICULTURAL EXPERIMENT STATION
O. G. BENTLEY, DIRECTOR
South Dakota State College
COLLEGE STATION, BROOKINGS, SOUTH DAKOTA
Penalty for private use to avoid payment of postage, $300
Free-Report of Progress
Permit No. 1141

To

R. C. Wahlstrom
Animal Husbandry